REMARKS/ARGUMENTS

Claims 1-20 are pending. No claim has been amended or added. Claims 10-18 have been canceled.

Claims 1-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. in view of Fischer et al. Applicants respectfully traverse the rejection. The claimed embodiments relate to preventing degradation of the refresh time. One cause for the degradation of the refresh time is the decrease of the width of a depletion layer between the p-type well 11A and the cell junction 17 (see specification, page 4, lines 19-27). This results because the plug ion-implantation region 20 and the cell junction 17 that have significantly different dopant concentrations directly contact each other.

The claimed embodiments prevent such a degradation of the refresh time by preventing the occurrence of abrupt concentration differences between the cell junction 38 and the plug ion-implantation region 39. This is done by using at least two different energy levels to form the plug ion-implantation region 39, thereby providing a concentration profile having a gradual slope (see Fig. 3). That is, the concentration difference between the cell junction 38 and the plug ion-implantation region 39 occurs gradually. In addition, the second dopants are implanted via the buffer layer 38 using at least two different energy levels to provide a concentration profile having a gradual slope (see specification, page 10, lines 9-23).

Claim 1 recites, "forming a buffer layer over the cell junctions; and implanting second dopants of first conductivity type through the buffer layer and into the cells junctions using a first energy level to form a plurality of plug ion-implantation regions, the plug ion-implantation regions being configured to receive the contact plugs; implanting the second dopants of first conductivity type through the buffer layer and into the cell junctions using a second energy level that is different from the first energy level to form the plug ion-implantation regions...wherein the buffer layer is configured to enable a higher implantation energy to be used to implant the second dopants, so that a concentration profile of the second dopants has a reduced slope."

Tran et al. does not disclose or suggest using at least two different implantation energy levels to form "the plug ion-implantation region 39," in the manner recited. Tran et al. also does not disclose the use of the buffer layer in the manner recited. Fischer et al. discloses forming diffusion regions (or cell junctions) having a gradual slope (see Fig. 6). Fischer et al. does not disclose or suggest forming "the cell junction" and "the plug ion-implantation region" in the manner recited in claim 1. As with Tran et al., Fisher et al. does not disclose the use of the buffer layer to obtain a concentration profile having a gradual slope. Claim 1 is allowable at least for the reasons set forth above. Claims 2-9 depend from claim 1 and are allowable at least for this reason. Claims 10-18 have been canceled.

Claim 19 recites, "forming a buffer layer over the regions defined by the gate structures; and implanting second dopants of first conductivity type through the buffer layer and into the regions defined by the gate structures using a first energy level to form a plurality of plug ion-implantation regions, the plug ion-implantation regions being configured to receive the contact plugs, wherein the cell junctions and the plug ion-implantation regions are defined within the well, wherein the second dopants are implanted into the substrate via the buffer layer to obtain a concentration profile of the second dopants in the substrate that has a reduced slope, and wherein the reduced slope of the concentration profile of the second dopants suppresses a width of a depletion layer from being decreased, the depletion layer being provided between the well and the cell junctions." Claim 19 recites implanting the second dopants via the buffer layer to obtain a reduced slope, so that the reduced slope suppresses a width of a depletion layer from being decreased, the depletion layer being provided between the well and the cell junctions. Neither Tran et al. nor Fischer et al. discloses such features. Claim 19 is allowable.

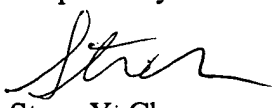
Claim 20 recites, "implanting the second dopants of first conductivity type through the buffer layer and into the regions defined by the gate structures using a second energy level that is different from the first energy level to form the plug ion-implantation regions, wherein the plug ion-implantation regions are formed using at least two different energy levels to provide the concentration profile of the second dopants in the substrate with a reduced slope." Neither Tran et al. nor Fischer et al. discloses such features. Claim 20 is allowable.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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